ML610Q359/ML610Q360 Reference Board User's Manual

ML610Q359/ML610Q360 Reference board is prepared by LAPIS Semiconductor to have you study the operations of ML610Q359/ML610Q360.
The board is arranged so that necessary components are mounted by you according to your purpose, then only minimum necessary components are mounted on the board by LAPIS Semiconductor for brief use of ML610Q359/ML610Q360.
By using the board with "uEASE on-chip debug emulator" (hereinafter referred to "uEASE") and "free sample U8 Development Tools CD-ROM" which is bundled in the package of uEASE not only Software development/debugging but also writing Flash ROM in the devices are capable.
This board also works in stand alone mode with external power suppy without uEASE.
Before starting works with this board, read below carefully and understand notices.

A) The board features

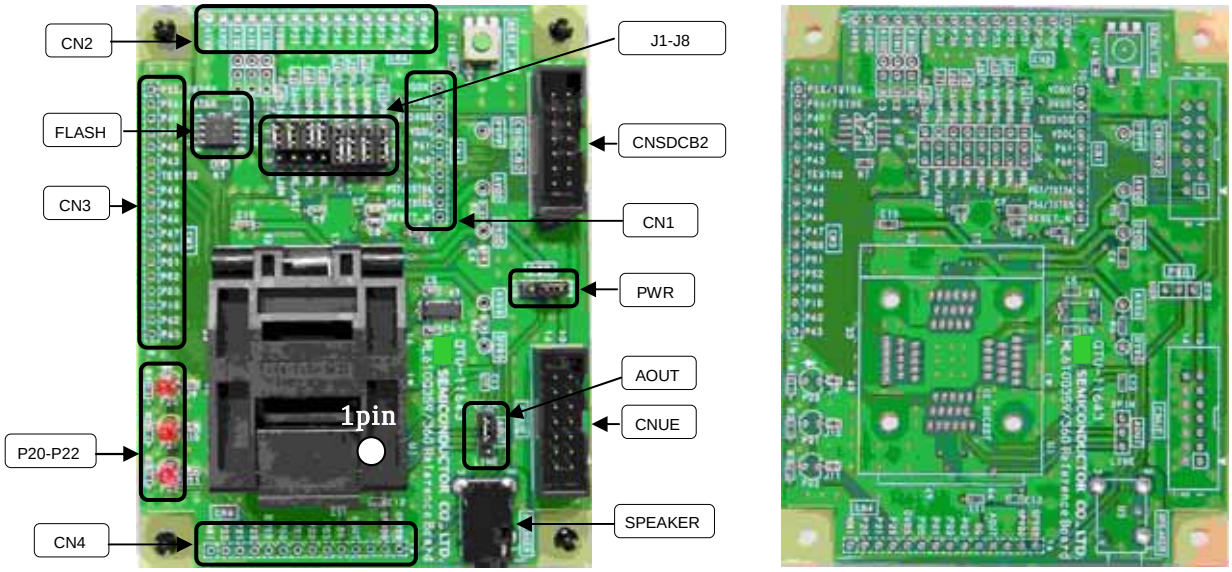
Incorporates ML610Q359/ML610Q360 or 64pin IC-Socket
Supports flash ROM programming and on-chip debugging (using TEST0 and TEST1_N pins)
High extendibility; Through-holes for your peripheral board are equipped with microcontroller pins
The power supply used can be selected (uEASE or peripheral board)
Prepared the pad to mount parts (parts necessary for microcontroller operation)
The connector connectable to SDCB2 is carried. The program of the sound data to built-in P2ROM/external FLASH is possible using SDCB2.
Please refer to G) for the connection method of SDCB2 and the program/verify method of the sound data to built-in P2ROM/external FLASH.

B) The board hardware specifications

Please refer to the reference schematics for detail on connections of each hardware parts.

Embedded microcontroller	U1: 64pin IC socket for ML610Q359/ML610Q360
Embedded parts	PWR: Jumper for input power supply switch (3pin pin-header and short pin)
	AOUT: Connection switch of a LINE output and a speaker amplifier analog input (3pin pin header and a short pin)
	J1-J8: **The jumper for rewriting of Built-in P2ROM/External FLASH by CNSDCB2** (3pin pin header and a short pin) (8 pieces)
	RESET_SW: Reset switch for M25PE16
	SPEAKER: Jack for speaker connection
	R1 – R3: Resistance for light emitting diodes (P20-P22)
	R4: Pull-up resistance for RESET_N
	R7: Pull-up resistance for W/ port of M25PE16
	P20 - P22: Light emitting diodes
	CNUE: Connector for on-chip debug emulator (14pin connector)
	CNSDCB2: Conector for Sound Device Control Board2(SDCB2) (14pin connector)
	C4, C7 - C13: Capacitors for power supply (8 pieces)
	C5-C6: Capacitors for XTAL(2pieces)
	C14: Capcitors for reset of M24PE26 (1piece)
	XT: 32.768kHz oscillator (1piece)
	FLASH: M25PE16 (1piece)
Pads for mounting	C1 -C3: Capacitors for SA-ADC input voltage connection (3 pieces)
	CN1 - CN4: Pads for peripheral board connectors (10pin x 1, 16pin x 1, 18pin x 1, 14pin x 1, 2.54mm pitch)
	J9 – J11: Land for light emitting diodes (P20-P22)
	R5 – R6: Pads for opening or short
Other useful pads	DVDD, DVSS, AVDD, AVSS, AIN0 – AIN2
Operating voltage	+2.2V to +3.6V
Board size	80.00 x 100.00 mm

C) Parts layout



<fig.1 Parts layout>

D) Jumper set up

PWR, AOUT jumper is set as follows.

Jumper Pin No.	Short (1) and (2) (1) (2) (3)	Short (2) and (3) (1) (2) (3)
PWR	USR：Use of user's power supply	SYS：Use of uEASE power supply
AOUT	SPIN：Use of internal speaker amplifier	LINE：Use of external speaker amplifier

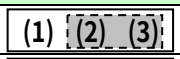
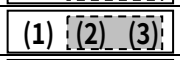
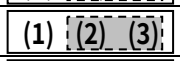
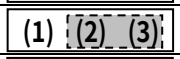
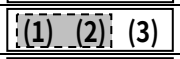
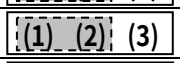
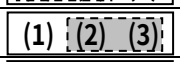
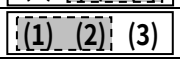
J1－J8 jumpers shall be used by default status as follows.

Program/Verify built-in P2ROM

Please refer to G) for the connection method of SDCB2 and the program/verify method of the sound data.

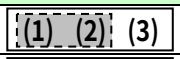
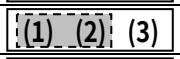
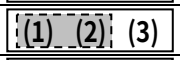
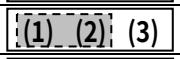
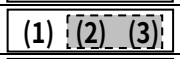
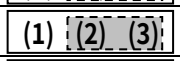
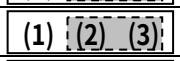
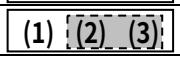
Jumper Pin No.	The condition of connection	
J1	(1) (2) (3)	Short (1) and (2)
J2	(1) (2) (3)	Short (2) and (3)
J3	(1) (2) (3)	Short (2) and (3)
J4	(1) (2) (3)	Short (2) and (3)
J5	(1) (2) (3)	Short (1) and (2)
J6	(1) (2) (3)	Short (1) and (2)
J7	(1) (2) (3)	Short (1) and (2)
J8	(1) (2) (3)	Short (1) and (2)

Read built-in P2ROM data by MCU

Jumper Pin No.	The condition of connection	
J1		Short (2) and (3)
J2		Short (2) and (3)
J3		Short (2) and (3)
J4		Short (2) and (3)
J5		Short (1) and (2)
J6		Short (1) and (2)
J7		Short (2) and (3)
J8		Short (1) and (2)

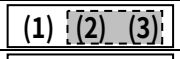
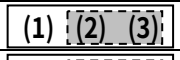
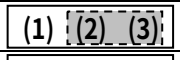
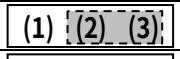
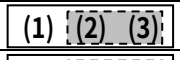
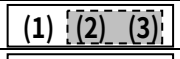
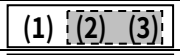
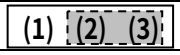
Program/Verify external FLASH

Please refer to G) for the connection method of SDCB2 and the program/verify method of the sound data.

Jumper Pin No.	The condition of connection	
J1		Short (1) and (2)
J2		Short (1) and (2)
J3		Short (1) and (2)
J4		Short (1) and (2)
J5		Short (2) and (3)
J6		Short (2) and (3)
J7		Short (2) and (3)
J8		Short (2) and (3)

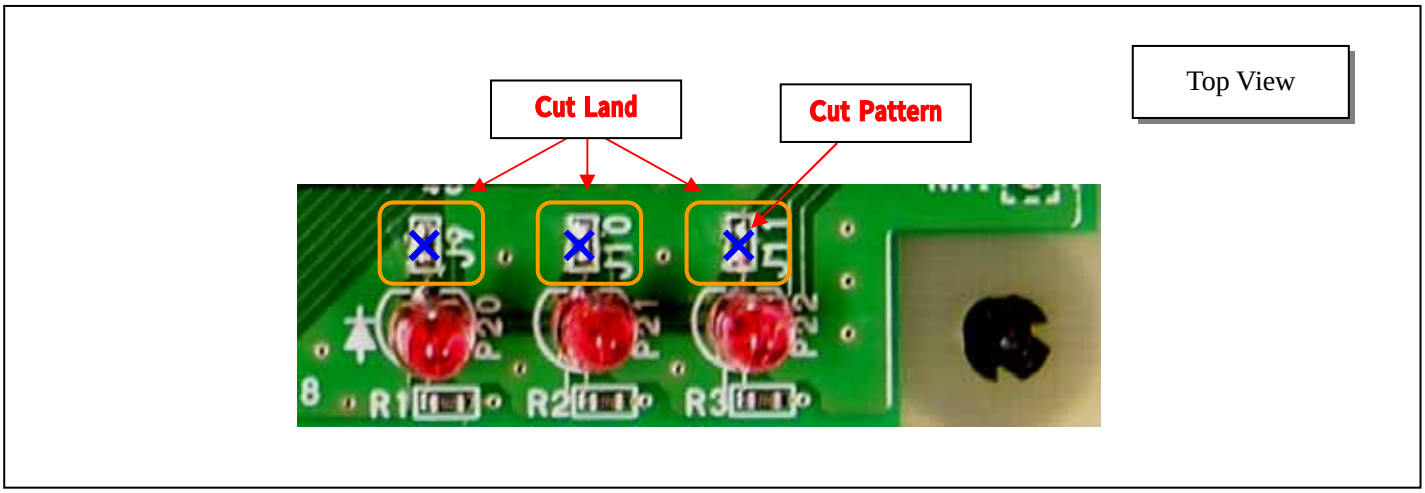
*Please write data in external FLASH without setting a device to a socket.

Read external FLASH data by MCU

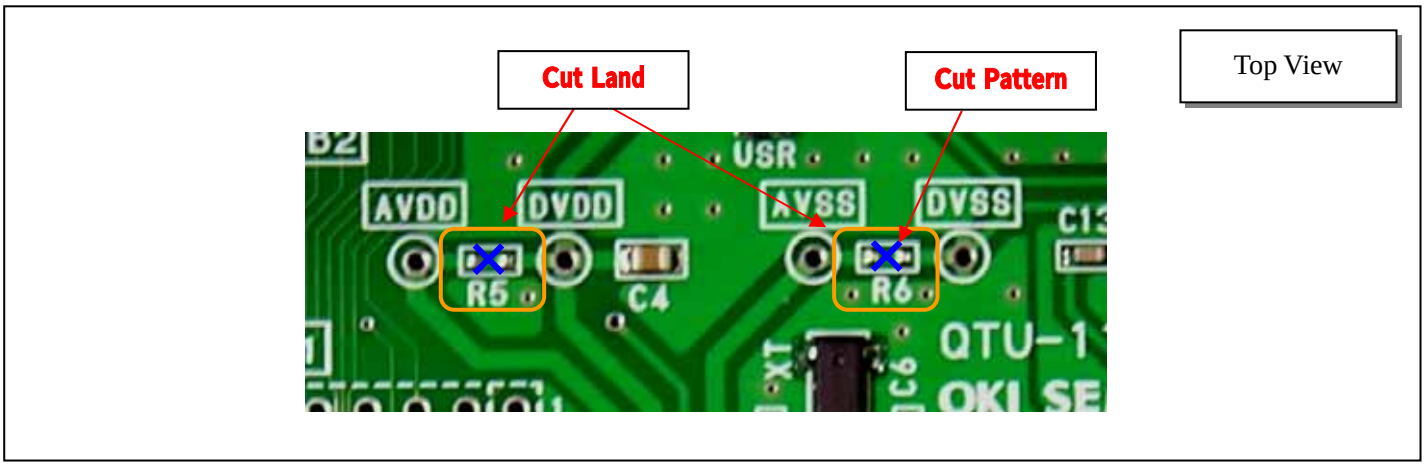
Jumper Pin No.	The condition of connection	
J1		Short (2) and (3)
J2		Short (2) and (3)
J3		Short (2) and (3)
J4		Short (2) and (3)
J5		Short (2) and (3)
J6		Short (2) and (3)
J7		Short (2) and (3)
J8		Short (2) and (3)

E) Notes on use

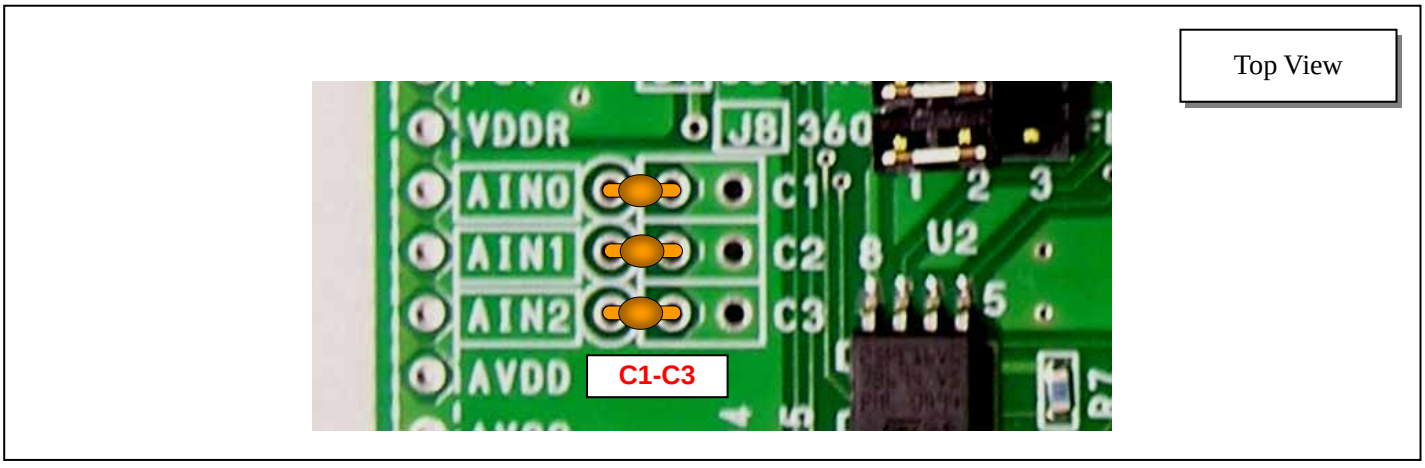
(1) The information contained herein can change without notice owing to product and/or technical improvements.
Before using the product, please make sure that the information being referred to is up-to-date.
(2) Before using this board, read carefully and understand the contents of the ML610Q359/ML610Q360 user's manual and the uEASE user's manual.
(3) The engineering sample of ML610Q359/ML610Q360 might be mounted on the board.
Therefore, please confirm the characteristic finally by using MP of ML610Q359/ML610Q360 and customer's mass production boards.
(4) LAPIS Semiconductor will not provide any support for this board, but the board can be exchanged with a new product only when it has an initial failure.
(5) Notes when the PWR jumper is set to USR side and the uEASE is connected.
Turn on the power supply of the peripheral board after starting the uEASE..
Moreover, Stop the uEASE after turning off the power supply of the peripheral board.
(6) When the PWR jumper is set to the uE side, the ability to supply power of the uEASE is +3.3v/100mA.
(7) Notes when the RESET_N signal is prepared on the peripheral board side.
If you use the uEASE, open or set DVDD-level RESET_N signal pin (CN1_1pin).
(8) There is a possibility of short the circuit when using it on electro conductive so that the board may have the pattern on the solder side.
Therefore, please use the board on nonconductivity or put the protection parts on the solder side if necessary.
(9) When you use SA-ADC:
Please mount noise decrease capacitor (C1 - C3) for AIN0 – AIN2 if necessary when you select the use of AIN0 – AIN2 (without using CN2) on the board. (Refer to fig.4.)
AVDD is wired with DVDD through R5. Please cut the short pattern of the R5 when you use AVDD, as shown in the fig.3.
AVSS is wired with DVSS through R6. Please cut the short pattern of the R6 when you use AVSS, as shown in the fig.3.
(10) When you don’t use light emitting diodes:
P20-P22 can drive direct to light emitting diodes. P20-P22 are wired with light emitting diodes through J9 – J11.
Please cut the land of the J9 – J11 when you don’t use light emitting diodes, as shown in the fig.2.
(11) The following parts are mounted on the board:
C4, C7-C11, CNUE, CNSDCB2, R4-R7, P20-P22, XT, RESET_SW, SPEAKER, PWR, AOUT, U1 (64pin IC socket)
(12) The following parts are not mounted on the board:
C1-C3, CN1-CN4



<fig.2 P20-P22 Light emitting diodes>



<fig.3 AVDD,AVSS>

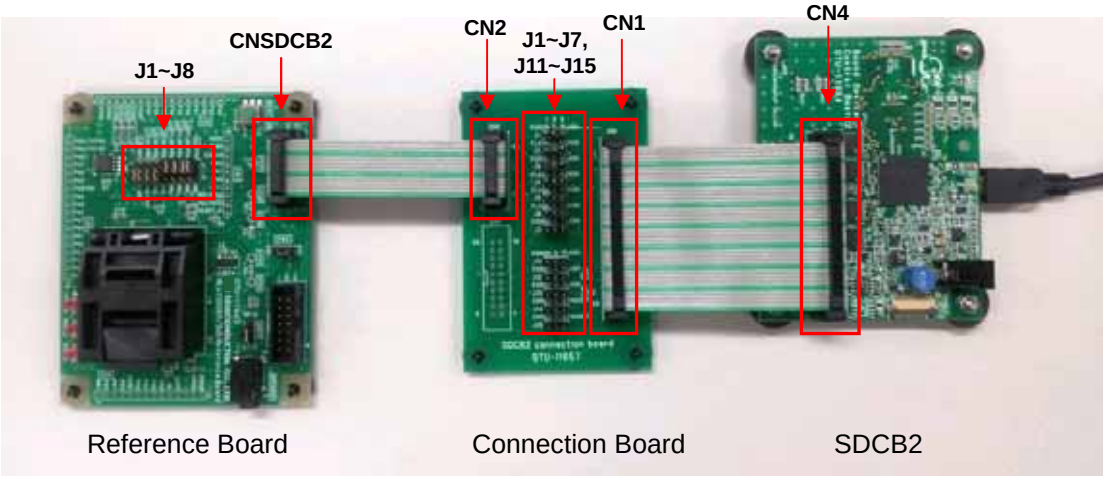


<fig.4 AIN0-AIN2 (SA-ADC)>

F) The connection method of SDCB2 and the program/verify method of the sound data

1 Connection of Board

As shown in the following figure, connect Reference Board, Connection board, and SDCB2.



2 Connection of Jumper

Connect the jumper of a reference board and a connection board as follows, respectively. In addition, perform the change of a jumper after plug out a power cable and a USB cable.

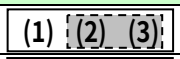
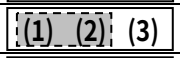
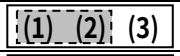
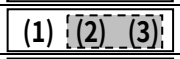
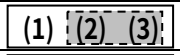
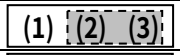
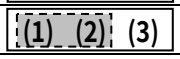
2.1 Case of external Flash writing

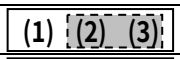
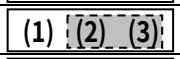
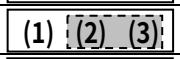
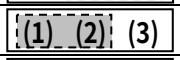
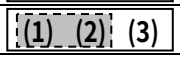
2.1.1 Reference board

Jumper Pin No.	The condition of connection	
J1	(1) (2) (3)	Short (1) and (2)
J2	(1) (2) (3)	Short (1) and (2)
J3	(1) (2) (3)	Short (1) and (2)
J4	(1) (2) (3)	Short (1) and (2)
J5	(1) (2) (3)	Short (2) and (3)
J6	(1) (2) (3)	Short (2) and (3)
J7	(1) (2) (3)	Short (2) and (3)
J8	(1) (2) (3)	Short (2) and (3)

*Please write data in external Flash without setting a device to a socket.

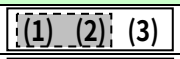
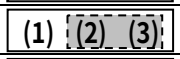
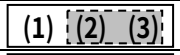
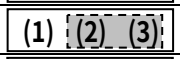
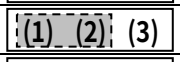
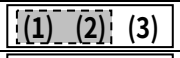
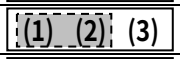
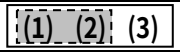
2.1.2 Connection Board

Jumper Pin No.	The condition of connection	
J1		Short (2) and (3)
J2		Short (1) and (2)
J3		Short (1) and (2)
J4		Short (2) and (3)
J5		Short (2) and (3)
J6		Short (2) and (3)
J7		Short (1) and (2)

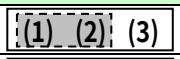
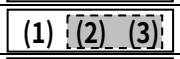
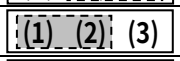
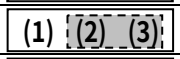
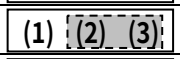
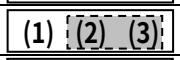
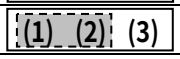
J11		Short (2) and (3)
J12		Short (2) and (3)
J13		Short (2) and (3)
J14		Short (1) and (2)
J15		Short (1) and (2)

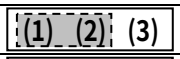
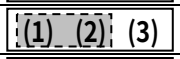
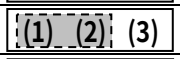
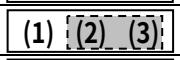
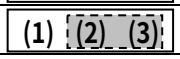
2.2 Case of built-in P2ROM writing (only for ML610Q360)

2.2.1 Reference board

Jumper Pin No.	The condition of connection	
J1		Short (1) and (2)
J2		Short (2) and (3)
J3		Short (2) and (3)
J4		Short (2) and (3)
J5		Short (1) and (2)
J6		Short (1) and (2)
J7		Short (1) and (2)
J8		Short (1) and (2)

2.2.2 Connection Board

Jumper Pin No.	The condition of connection	
J1		Short (1) and (2)
J2		Short (2) and (3)
J3		Short (1) and (2)
J4		Short (2) and (3)
J5		Short (2) and (3)
J6		Short (2) and (3)
J7		Short (1) and (2)

J11		Short (1) and (2)
J12		Short (1) and (2)
J13		Short (1) and (2)
J14		Short (2) and (3)
J15		Short (2) and (3)

3 Writing by Board Controller

3.1 External Flash

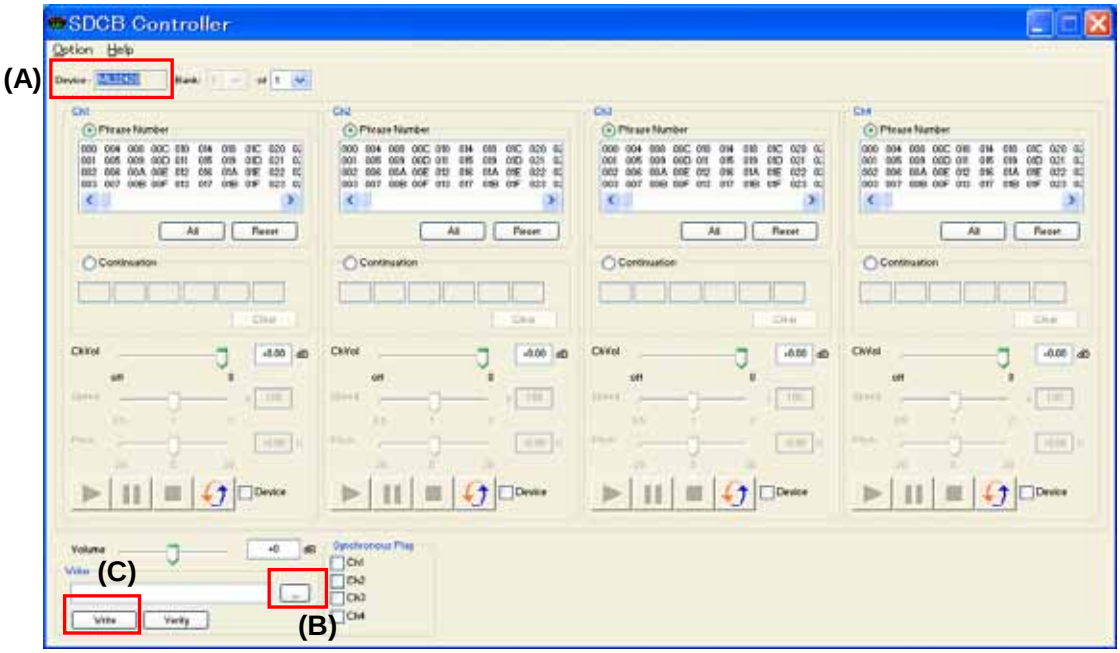
(1) Set each jumper to the condition of Section 2.1.

(2) After starting Speech Utility, click "Board Controller" in a “Tools” menu. Board controller starts (The following figure).

At this time, check being displayed on “Device(A)” in the following figure as “ML22420.”

(3) Click “…(B)” button in the following figure and select the sound data of a S format or a BIN format.

(4) If “Write(C)” button in the following figure is clicked, writing and verification will begin.



(5) The message of “Write Completed!” will be displayed if writing and verification are completed normally.

3.2 Built-in P2ROM

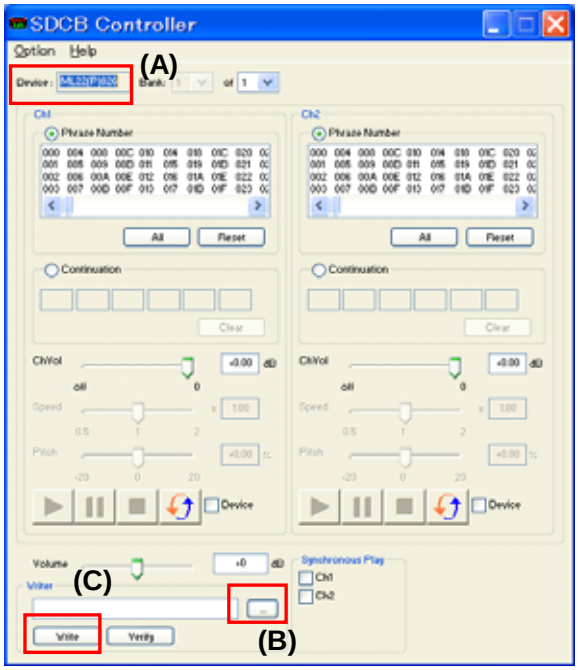
(1) Set each jumper to the condition of Section 2.2.

(2) After starting Speech Utility, click "Board Controller" in a “Tools” menu. Board controller starts (The following figure).

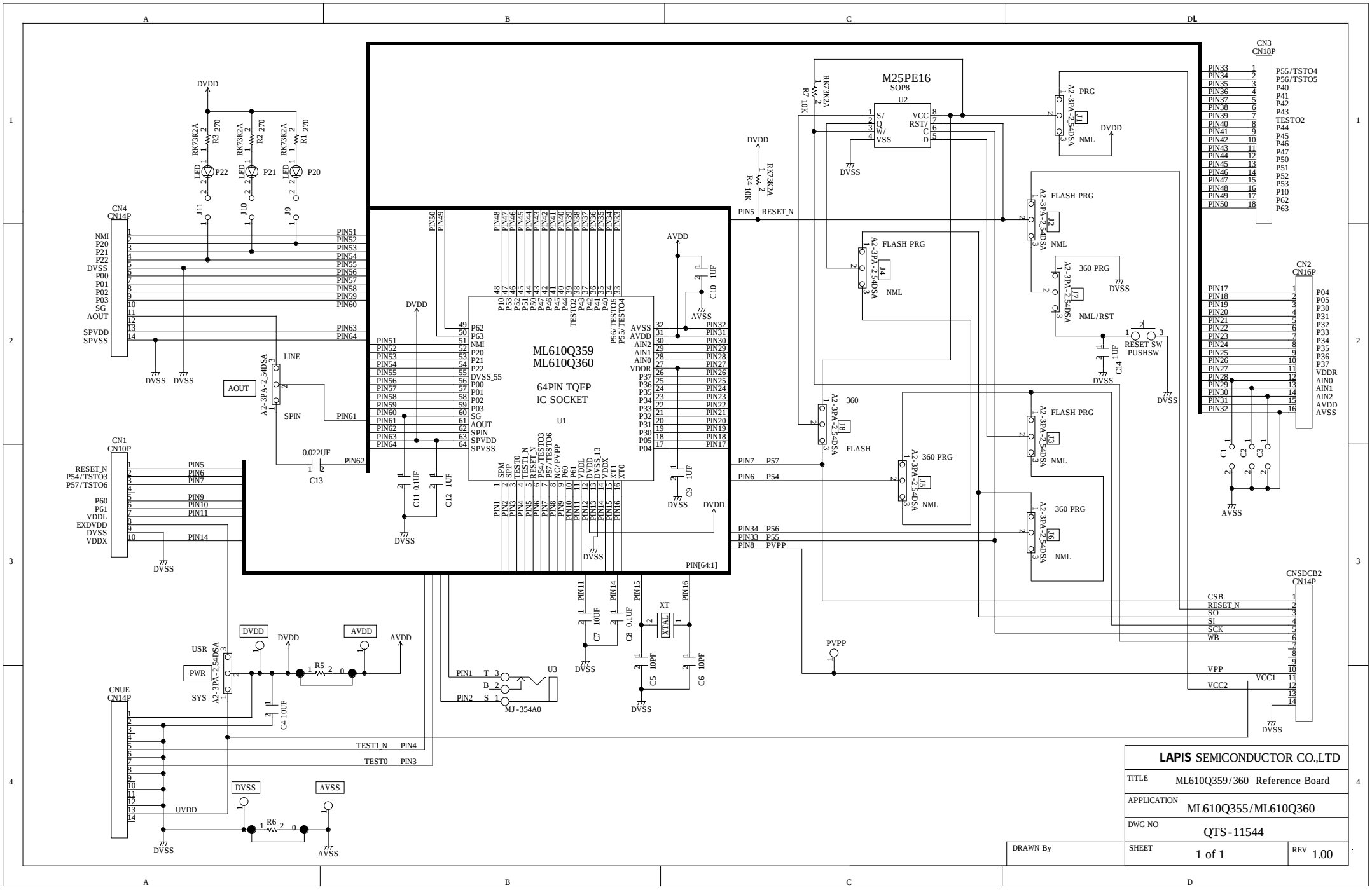
At this time, check being displayed on “Device(A)” in the following figure as “ML22(P)826.”

(3) Click “…(B)” button in the following figure and select the sound data of a S format or a BIN format.

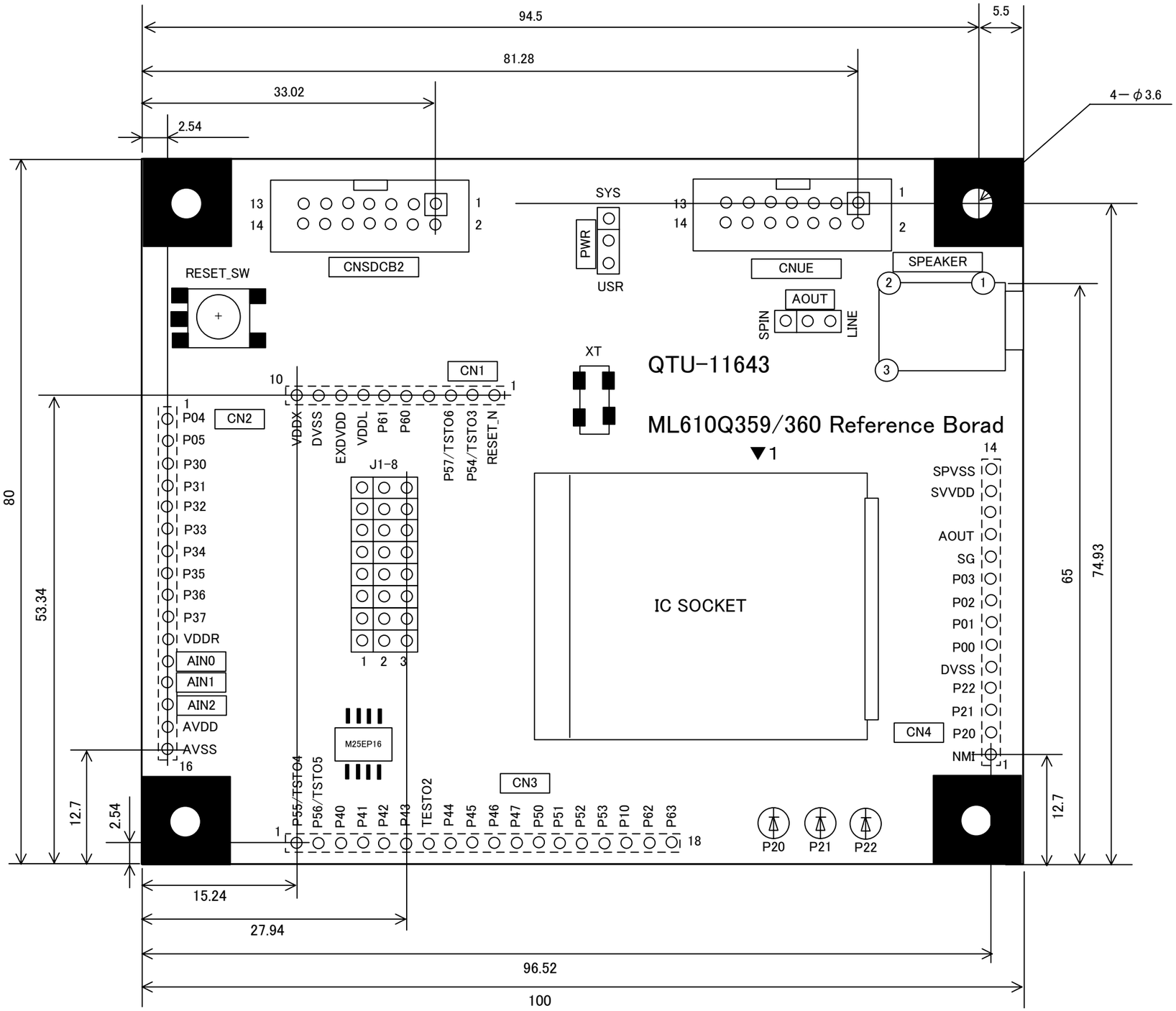
(4) If “Write(C)” button in the following figure is clicked, writing and verification will begin.



(5) The message of “Write Completed!” will be displayed if writing and verification are completed normally.



LAPIS SEMICONDUCTOR CO.,LTD	
TITLE	ML610Q359/360 Reference Board
APPLICATION	ML610Q355/ML610Q360
DWG NO	QTS-11544
DRAWN By	
SHEET	1 of 1
REV	1.00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CNSDCB2
SYS
PWR
USR
CNUE
SPEAKER
RESET_SW
AOUT
SPIN
LINE
XT
QTU-11643
ML610Q359/360 Reference Borad
▼1
CN1
CN2
P04
P05
P30
P31
P32
P33
P34
P35
P36
P37
VDDR
AIN0
AIN1
AIN2
AVDD
AVSS
VDDX
DVSS
EXDVDD
VDDL
P61
P60
P57/TSTO6
P54/TSTO3
RESET_N
J1-8
M25EP16
IC SOCKET
SPVSS
SVVDD
AOUT
SG
P03
P02
P01
P00
DVSS
P22
P21
P20
NMI
CN4
CN3
P55/TSTO4
P56/TSTO5
P40
P41
P42
P43
TESTO2
P44
P45
P46
P47
P50
P51
P52
P53
P10
P62
P63
P20
P21
P22
80
53.34
12.7
2.54
65
74.93
15.24
27.94
96.52
100